M.8

Electrical measurement and control

Portable power analyzer

M.8 - Portable power analyzer

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Portable power analyzers

CIRCUTOR offers a range of portable instruments that have been designed to detect the main electrical problems in industries and installations.

M.8

Definition

These portable power analyzers offer top performance features. They have been designed to cater for the requirements of any installation and type of measurement.

The **AR5** / **AR5-L** types have an internal memory that stores all parameters required: **fully programmable**. In addition, the same analyzer can have various types of software and their applications will be used in different types of analysis.

What are the advantages of portable power analyzers?

1. Savings

- Detection and prevention of excess consumption (kW·h)

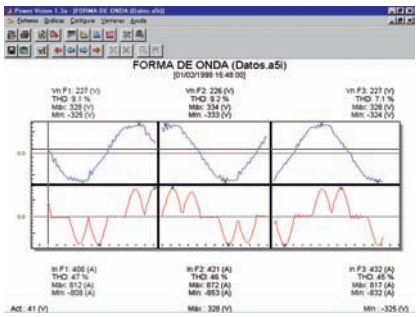
Analysis of load curves to see the points of maximum demand of energy. Detection of the need for a capacitor bank in an installation, as well as their power.Detection of fraud in energy meters.

2. Prevention

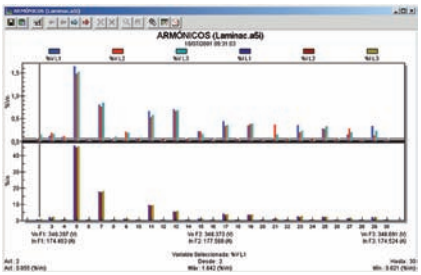
- The **AR5** series has been specially designed for the periodic maintenance of the status of low and medium voltage electrical networks; to check the motor start-up curves, detect potential saturations in the power transformer, power cuts, deficient quality of the power supply, etc.

3. Resolution

- Analysis of the source of problems in the electrical network in order to solve the problems of unforeseen trips, earth leakages, cable heating, resonance, harmonics, disturbances, *flicker*, phase unbalances, etc. At the same time, you can design the adequate size of active or passive harmonic filters and filters for speed variators, etc.



Example of an application with AR5-L, observing the wave quality in PowerVision



Example of an application with AR5-L, observing the harmonics in PowerVision

4. Analysis programs

CIRCUTOR offers 6 types of programs (only for **AR5** / **AR5-L**) :

1. Harmonics: Analysis of all electrical parameters: voltage, current, power, energy and a long etcetera.

2. Disturbances - Power supply quality: Detection of interruptions, gaps, overvoltages or any alteration in the wave shape.

3. Flicker: The flicker in the installation can be studied.

4. Fast Check – Motor start-up: Single or three-phase studies can be performed to capture the voltage, current, power and power factor during cycle periods.

5. Check Meter: Checks the measurements of electronic and mechanical meters. It also determines the errors in active energy or PF meters.

6. Leak Meter: Detection and analysis of leakages (earth leakages).

7. File Vision: Display of the records on the unit, with no need for a PC.

Applications

Performing energy studies of the wave quality and disturbances.

AR5 / AR5-L

Portable single and three-phase power analyzer

Description

- Measures all of the main electrical parameters of an electricity network
- Measurement in true root mean square
- Built-in energy meter
- With 4 voltage channels and 4 current channels (**AR5-L**)
- Configurable auto-trigger, depending on the parameters required
- Languages: Spanish and English
- Large backlit LCD display
- CAT III 600 V (**EN 61010**). **UL** Certificate
- Display of up to 30 electrical parameters on the screen
- Small size and reduced weight, only 800 g
- Independent files for each measurement
- Including the powerful analysis software: **POWER VISION**
- Configurable with menus
- Optional operation with no external power supply, with an autonomy of up to 8 hours
- RS-232 Communications with PC
- Clamp auto-detection
- Auto-selection of parameters stored
- Calculation of the time remaining until the memory is full
- Linear or rotating memory (depending on the configuration)

Features

	AR5	AR5-L
Power supply circuit		
Through an external power supply unit	100...240 V ac / 12 V dc	
Frequency	50...60 Hz	
Consumption	15 V·A	
Operating temperature	0...+40 ºC	
Altitude	≤ 2 000 m	
Humidity of operation	80 % for temperatures under 31 ºC, with a linear decrease down to 50 % at 40 ºC	
Measurement circuit	Three-phase (3 wires)	Three-phase (3 / 4 wires)
Contamination level	2	
Voltage circuit		
Measurement range	In accordance with the clamp, 0.01 A...20 kA	
Voltage and current transformation ratios	Programmable	
Measurement units	Automatic change of scale	
Internal memory	1 Mb	
Accuracy class (*)		
Voltage	0.5 % ± 2 digits	
Current	0.5 % ± 2 digits	
Active power	1 % ± 2 digits	
Power factor	1 % ± 2 digits	
Build features		
Housing	Reinforced insulation	
Keyboard / Display	On the front panel	
Display	LCD 160 x 160 pixels (backlit)	
Current clamp connector	3	3 / 4
Dimensions	220 x 60 x 130 mm	
Weight	800 g	
RS-232 Outputs	Series output	

AR5 / AR5-L

Portable single and three-phase power analyzer

Application

- Complete study of the installation where the analyzer is capable of gathering different types of records: harmonics, disturbances, meter verification, transients, flicker, etc.

Features

	AR5	AR5-L
Safety	Category III - 600 V, in accordance with 61010	
Standards		
EN 61000-3-2 (1995), Harmonics		
EN 61000-3-3 (1995), Voltage fluctuations		
EN 61000-6-4 (2002), Industrial emissions **EN 55011 (1994), Driven (EN 52022 – Class B)** **EN 55011 (1994), Radiated (EN 55022 – Class A)**		
EN 61000-6-2 (2022), Industrial immunity **EN 61000-4-2 (1995), Electrostatic discharge** **ENV 50140 (1993), Radiated electromagnetic field** **EN 61000-4-8 (1995), Rapid transient bursts** **ENV 50141 (1993), RF in common mode** **EN 61000-4-8 (1995), Magnetic field at 50 Hz**		
EN 61000-6-1 (2002), Domestic immunity **EN 61000-4-5 (1995), Shockwave** **EN 61000-4-11 (1994), Power supply interruptions**		
(*) Accuracy is given by the following measurement conditions: Exclusion of errors produced by the clamps and external voltage transformers, with a range of temperature of 5 ... 45 ºC and power factor of 0 ... 1		

References

Analyzer	Clamps	Program	Transport	Type	Code
			Units		
AR5	-	Energy / Harmonics	Carrying Bag	**AR5- Power analyzer with 3 current inputs**	**M80103**
AR5-L	-	Energy / Harmonics	Carrying Bag	**AR5-L- Power analyzer with 4 current inputs**	**M80111**
			AR5 Kits		
AR5	3 x CPR-1000	Energy / Harmonics	Carrying Bag	**3 AR5 Kit**	**M80711**
AR5	3 x CP-2000 / 200	Energy / Harmonics	Carrying Bag	**4 AR5 Kit**	**M80721**
AR5	3 x CP-2000 / 200 3 x CP-5	Energy / Harmonics and Disturbances	Carrying Bag	**5 AR5 Kit**	**M80732**
AR5	3 x CPR-500	Energy / Harmonics and Disturbances	Carrying Bag	**9 AR5-RBT Kit**	**M80781**
			AR5-L Kits		
AR5-L	3 x CPR-1000 1 x CPR-500	Energy / Harmonics	Carrying Bag	**3L AR5-L**	**M80811**
AR5-L	3 x CPR-2000/200 1 x CPR-1000	Energy / Harmonics	Carrying Bag	**4L AR5-L**	**M80821**
AR5-L	3 x CPR-2000/200 1 x CPR-10003 x CP-5	Energy / Harmonics and Disturbances	Carrying Bag	**5L AR5-L**	**M80832**
AR5-L	3 x C-FLEX–45 cm 1 x CF-5	Energy / Harmonics and Disturbances	Carrying Bag	**11L AR5-L-RBT**	**M80843**
AR5-L	3 x C-FLEX-80 cm 1 x CF-5	Energy / Harmonics and Disturbances	Carrying Bag	**12L AR5-L-RBT**	**M80853**
AR5-L	3 x C-FLEX-45 cm 1 x CF-5	Energy / Harmonics and Disturbances	Case	**11LM AR5-L-RBT**	**M80643**
AR5-L	3 x C-FLEX-80 cm 1 x CF-5	Energy / Harmonics and Disturbances	Case	**12LM AR5-L-RBT**	**M80653**
The two analyzers include: 3 voltage cables + power supply					
All kits include: 3 voltage cables + power supply + PowerVision software + energy / harmonics program + 3 clamps					

AR5 / AR5-L

Portable single and three-phase power analyzer

Parameters measured

Three-phase system, 4 wires

Parameter	Symbol (unit)	L1	L2	L3	Three-phase value
phase-neutral voltage	V	Yes	Yes	Yes	-
Current	A	Yes	Yes	Yes	Yes
Neutral current (only AR5-L)	I_N	Yes			
Frequency	Hz	Yes	-	-	-
Active power	kW	Yes	Yes	Yes	Yes
Power factor L	kvarL	Yes	Yes	Yes	Yes
Power factor C	kvarC	Yes	Yes	Yes	Yes
Apparent power	kVA	-	-	-	Yes
Power factor	PF	Yes	Yes	Yes	Yes
Active energy	kW·h	Yes	Yes	Yes	Yes
Power factor L	kvar·h L	Yes	Yes	Yes	Yes
Power factor C	kvar·h C	Yes	Yes	Yes	Yes
Voltage harmonics		Yes	Yes	Yes	-
Current harmonics		Yes	Yes	Yes	-
Current harmonics on neutral (only AR5-L)		Yes			

Three-phase system, 3 wires

Parameter	Symbol (unit)	L1-L2	L2-L3	L3-L1	Three-phase value
phase-phase voltage	V	Yes	Yes	Yes	-
Current	A	Yes	Yes	Yes	Yes
Frequency	Hz	Yes	-	-	-
Active power	kW	Yes	Yes	Yes	Yes
Power factor L	kvarL	Yes	Yes	Yes	Yes
Power factor C	kvarC	Yes	Yes	Yes	Yes
Apparent power	kVA	-	-	-	Yes
Power factor	PF	Yes	Yes	Yes	Yes
Active energy	kW·h	-	-	-	Yes
Power factor L	kvar·h L	-	-	-	Yes
Power factor C	kvar·h C	-	-	-	Yes
Voltage harmonics		Yes	Yes	Yes	-
Current harmonics		Yes	Yes	Yes	-

Two-phase System

Parameter	Symbol (unit)	L1-N	L2-N	Two-phase value L1-L2
phase-phase voltage	V	Yes	Yes	Yes
Current	A	Yes	Yes	Yes
Neutral current (only AR5-L)	I_N	-		
Frequency	Hz	Yes	-	-
Active power	kW	Yes	Yes	Yes
Power factor L	kvarL	Yes	Yes	Yes
Power factor C	kvarC	Yes	Yes	Yes
Apparent power	kVA	-	-	Yes
Power factor	PF	Yes	Yes	Yes
Active energy	kW·h	-	-	Yes
Power factor L	kvar·h L	-	-	Yes
Power factor C	kvar·h C	-	-	Yes
Voltage harmonics		Yes	Yes	-
Current harmonics		Yes	Yes	-
Current harmonics on neutral (only AR5-L)		Yes		

Single-phase system

Parameter	Symbol (unit)	L1-N
phase-phase voltage	V	Yes
Current	A	Yes
Frequency	Hz	Yes
Active power	kW	Yes
Power factor L	kvarL	Yes
Power factor C	kvarL / (-C)	Yes
Apparent power	kVA	Yes
Power factor	PF	Yes
Active energy	kW·h	Yes
Power factor L	kvar·h L	Yes
Power factor C	kvar·h C	Yes
Voltage harmonics		Yes
Current harmonics		Yes

Programs

AR5 / AR5-L

Portable single and three-phase power analyzer

Programs

Description	Equipment	Type	Code
Updating harmonics	AR5 and AR5-L	**Updating ARI**	**M80221**
Flicker (PST and PLT assessment)	AR5 and AR5-L	**FL Program**	**M80223**
Detection of network disturbances	AR5 and AR5-L	**PERTURB Program**	**M80224**
CHECK METER, meter verification system	AR5 and AR5-L	**CM Program**	**M80225**
Optic fibre sensor, shunts and CHECK METER program included	AR5-L	**Optical check meter kit**	**M806B3**
FAST CHECK, motor start-up	AR5 and AR5-L	**Fast Program**	**M80226**
LEAK METER, detection and analysis of leakages	AR5 and AR5-L	**Leak Program**	**M80229**
FILE VISION, display of files in AR5-L	AR5-L	**Fil Vision Program**	**M8022A**

Memory capacity example: In the Energy program, if you record 30 network parameters, with a registration period of 15 minutes, you obtain an autonomy of 80 days of memory.

Harmonics

The harmonics program can be used for the following:

- Analysis of all electrical parameters: voltage, current, power, energy, etc.
- Analysis of overheating in transformers, capacitors, etc.
- Detection of neutral current
- Wave shapes shown on the display in real time
- Zoom on a wave shape
- Harmonic decomposition display (30 or 50 harmonics)
- Calculation of the THD % in voltage and current

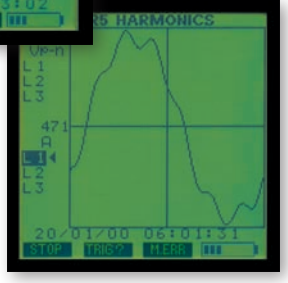
Applications:

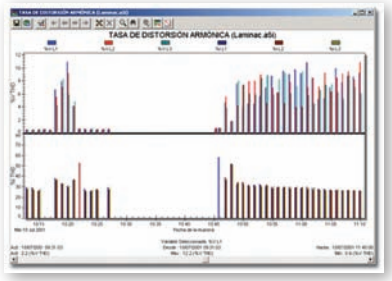
- Calculation of the diameter of cable required to support losses produced by harmonics
- Study of harmonic filtering applications
- Comparison of measurements taken, in accordance with the IEC standard
- Energy and billing study
- Study of installation consumption
- Analysis of the power factor compensation

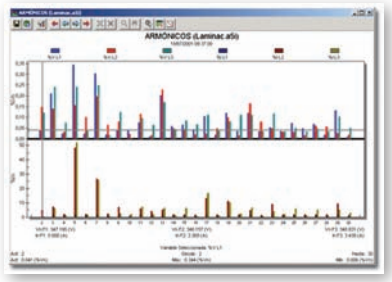
Graphical representation of:

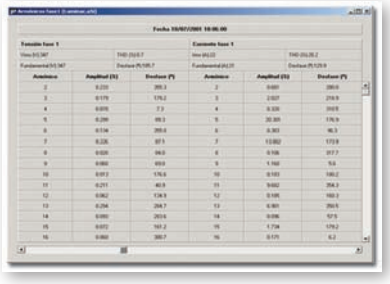
- Wave shapes and harmonic distortion
- Total harmonic distortion THD %
- Harmonic decomposition (up to order 50)
- True root mean square values for voltage and current
- It can be used to prepare tables and lists
- The direction of harmonics can be seen with software

Type	Code
Updating ARI	**M80221**









Programs

AR5 / AR5-L

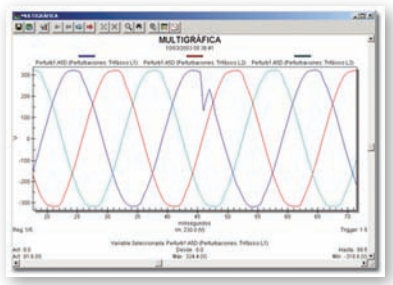
Portable single and three-phase power analyzer

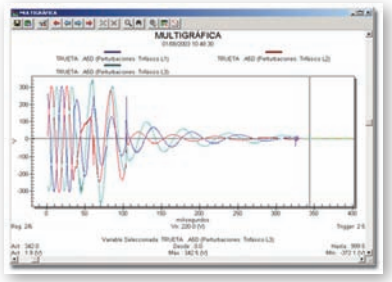
Network quality - Disturbances

Program applications:

- Detection of interruptions, gaps, micro-cuts, peaks, etc.
- Adjustment of the sensitivity for the capture of different types of disturbances
- Information about the number of disturbances detected
- Applications
- Check the effect of switching a load over various points of the installation
- Take "x-rays" of any installation with an **AR5** unit and a PC, in order to know everything about a supply network:
  - Evolution of the wave shape
  - Display of an alterationChecking the three phases during the alteration

Type	Code
PERTURB Program	M80224



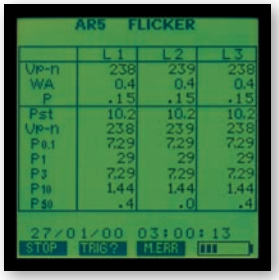


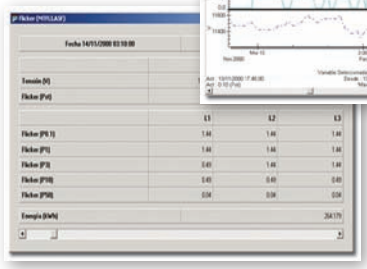
Flicker

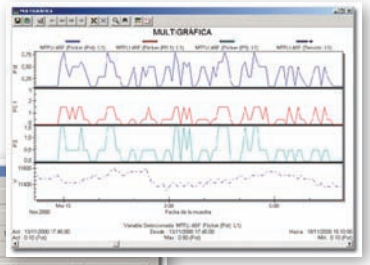
The flicker program can be used to:

- Study the flicker present in the installation, whether it is instantaneous, PST or PLT (the latter via software)
- Carry out the same operations executed by the energy program
- Configuration of the times for the calculation of the flicker and energy
- Flicker parameters on a single screen
- Applications
- Determine the level of visual disturbance that can lead to a decrease in the performance of workers
- Study voltage fluctuations

Type	Code
FL Program	M80223





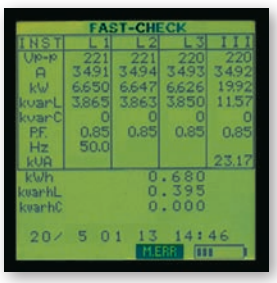


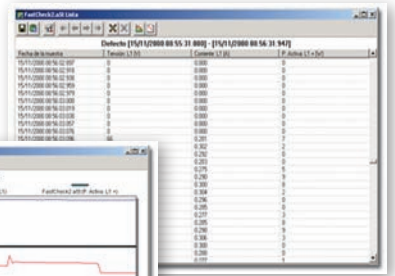
Motor start-up *(Fast check)*

This program can be used to:

- Perform studies on single or three-phase networks to capture the voltage, current, power and power factor during cycle periods
- Capture short voltages (for ex.: motor start-up, welding machines, etc.)
- Potential recording with a *trigger*
- Fixed or rotating memory

Type	Code
Fast Program	M80226





Programs

AR5 / AR5-L

Portable single and three-phase power analyzer

Check-Meter

The program can be used to:

- Check the measurements of electronic and mechanical meters
- Carry out the tests with no energy cuts
- Carry out 30-second long tests
- Determine the error in active energy or power factor meters
- Programmed setup and percentage error on a single screen
- Up to 4000 records can be created
- Numerical table
- Export to .bmp format or to the clamp-board

ApplicationsMeter verification studies, creation of detailed reports in each measurement point

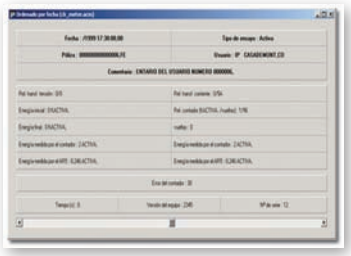
- Detection of errors that exceed 1 % (with the **AR5-L**-shunts calibrated set) in electricity meters
- Detect potential fraud situations

Type	Code
CM Program	**M80225**

Optical reader kit

- For electronic meters or meters with verification LED
- Optic fibre cable used to check meters
- Communications and power supply cable connected to **AR5**
- Measures impulses with a longitude that exceeds 1 us
- Shock-proof plastic
- Reduced dimensions: 64x41x26 mm

Type	Code
CM optical kit (includes sensor, shunts, program and software)	**M806C3**



Leak (only AR5-L)

- Measurement of leakage current, up to 10 A, with a transformer
- Measurement with current sensing clamp
- Measurement with earth leakage transformers
- Measurement scales with 2 mA ... 1 A clamp and 20 mA ... 10 A clamp
- Filtering of high frequencies to avoid the effect of switching systems
- Measurement of the true root mean square value during each period (20 ms)
- Continuous measurement with a record of each period of the programmed time
- Programmable record time 1 s ... 100 s
- Detection of the trip moment due to a voltage drop
- Detection of the trip moment, depending on the programmed leakage level

ApplicationsDetection of the trip level of protection relays

- Checking leakages with no need for manual analysis on the site

Type	Code
Leak Meter Program	**M80229**

Programs

AR5 / AR5-L

Portable single and three-phase power analyzer

File Vision (only AR5-L)

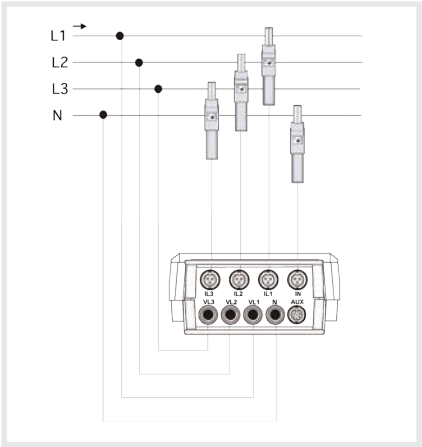
- On-site verification of records
- Display of records, with no need for a PC
- The screen has a cursor that indicates the position of the value of the variable selected, in terms of record time and parameter
- Auto-scalable axis of the parameter (adapted to the maximum and minimum values of all records
- Permanent display of 32 records on the screen
- Display of the maximum and minimum value of the records
- You can browse through records easily and quickly
- Variables represented by the different programs:

- Harmonics: Vpp, Vpn, A, W, var L, var C, PF, Hz, V·A, I_N, kW·h
- Check-Phase: Vpp, Vpn, A, W, var L, var C, PF, Hz, V·A, I_N, kW·h
- Flicker: Vpp, Vpn, A, W, var L, var C, PF, Hz, V·A, I_N, kW·h, Pst
- Fast-Check: Vpp, Vpn, A, W, var L, var C, PF, Hz, V·A, I_N

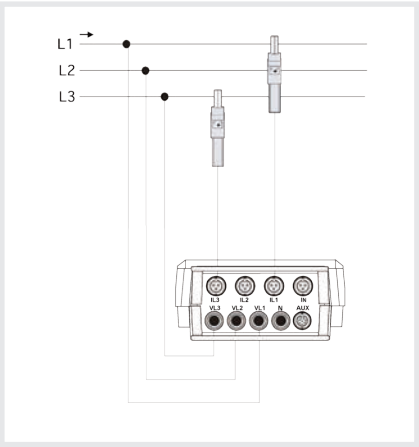
Type	Code
File Vision	M8022A

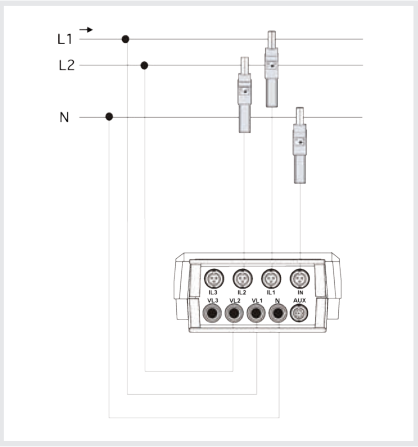
Connections

Three-phase system, 4 wires

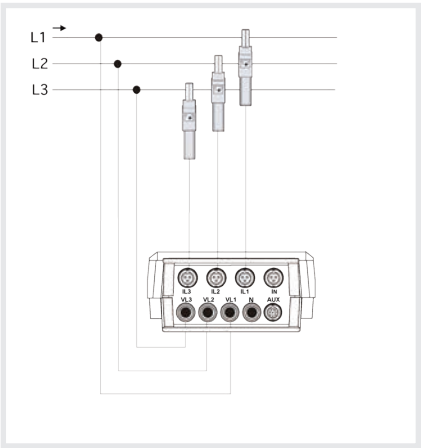


Three-phase system, 3 wires, ARON

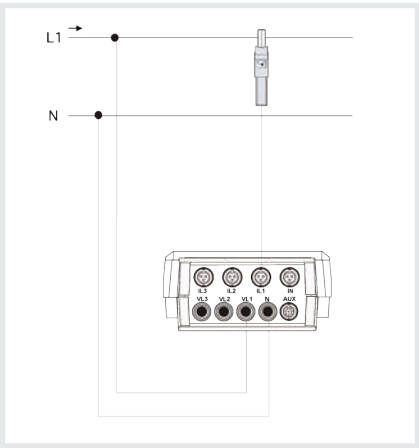




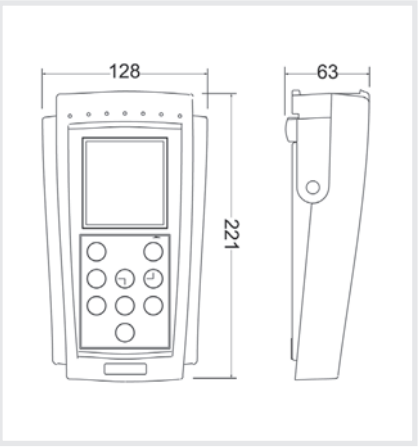
Three-phase system, 3 wires



Single-phase system



Dimensions



Clamps

AR5 / AR5-L

Portable single and three-phase power analyzer

Clamps	CF-5	CF-10	CP-5	CP-100	CPR-500	CPR-1000	CP-2000/200
Measurement range	1...1000 A ac	0.2 mA...10 A ac	0.05..0.5 A ac	1...100 A ac	1...500 A ac	1...1000 A ac	1...200 A ac 10...2000 A ac
Nominal frequency	48...65 Hz	48...65 Hz	48...65 Hz	48...65 Hz	48...65 Hz	48...65 Hz	48...65 Hz
Output voltage	2 V ac	2 V ac	2 V ac	2 V ac	2 V ac	2 V ac	2 V ac
Dielectric rigidity	5200 V, 50 Hz,1 min	5200 V, 50 Hz,1 min	5200 V, 50 Hz, 1 min	5200 V, 50 Hz, 1 min	5200 V, 50 Hz, 1 min	5200 V, 50 Hz, 1 min	5200 V, 50 Hz, 1 min
Scale base error	1 % (up to 0.1 A) 0.5 % (Up to 5 A)	-0,35 %	1 %	0,5 %	0,7 %	0,7 %	Scale 200: 0.5 % (+70 mA) Scale 2000: 0.5% (+100 mA)
Maximum conductor diameter	20 mm	100 mm	20 mm	20 mm	52 mm	52 mm	64 mm
Maximum busbar	1 - 50 x 5 mm or 4 - 30 x 5 mm	5 - 80 x 5 mm or 3 - 80 x 10 mm	20 x 5 mm	20 x 5 mm	1 - 50 x 5 mm or 4 - 30 x 5 mm	1 - 50 x 5 mm or 4 - 30 x 5 mm	5 - 125 x 5 mm or 3 - 100 x 10 mm
Description / Code	**CF-5** **Code M81331**	**CF-10** **Code M81334**	**3 CP-5 Kit** **Code M81041**	**3 CP-100 Kit Code M81042** **1 CP-100Neutral clamp (blue) Code M81036**	**3 CPR500 Kit Code M81043** **1 CPR-500Neutral clamp (blue) Code M81037**	**3 CPR-1000 Kit Code M81044** **1 CPR-1000 - Neutral clamp (blue)Code M81038**	**3 CP-2000/200 Kit Code M81045**

Clamps

AR5 / AR5-L

Portable single and three-phase power analyzer

Clamps	C-FLEX 20000/2000/200 A-120	C-FLEX 20000/2000/200 A-80	C-FLEX 20000/2000/200 A-45
Longitude sensor	120 cm	80 cm	45 cm
Scales	200 A / 2000 A / 20000 A or 100 A / 1000 A / 10000 A	200 A / 2000 A / 20000 A or 100 A / 1000 A / 10000 A	200 A / 2000A / 20000 A or100 A / 1000 A / 10000 A
Sensitivity in mV	Scale 200 or 100: 10 mV / A Scale 2000 or 1000: 1 mV / AScale 20k or 10k: 0.1 mV / A	Scale 200 or 100: 10 mV / A Scale 2000 or 1000: 1 mV / AScale 20k or 10k: 0.1 mV / A	Scale 200 or 100: 10 mV / A Scale 2000 or 1000: 1 mV / AScale 20k or 10k: 0.1 mV / A
Measurement amplitude	5 A...20 kA	5 A...20 kA	5 A...20 kA
Bandwidth	10...20 kHz	10...20 kHz	10...20 kHz
Accuracy	1 %	1 %	1 %
Electrical safety	Double insulation IEC 1010 - 100 V - Cat III - Degree of contamination 2	Double insulation IEC 1010 - 100 V - Cat III - Degree of contamination 2	Double insulation **IEC 1010** - 100 V - Cat III - Degree of contamination 2
Admissible output overvoltage	600 V (peak factor 1.5)	600 V (peak factor 1.5)	600 V (peak factor 1.5)
Ambient conditions			
Temperature	-10...+55 ºC	-10...+55 ºC	-10...+55 ºC
Humidity	90 % HR (at 50 ºC)	90 % HR (at 50 ºC)	90 % HR (at 50 ºC)
type kit	**Kit 3 C-FLEX 20000/2000/200 A-80 Kit**	**Kit 3 C-FLEX 20000/2000/200 A-80**	**Kit 3 C-FLEX 20000/2000/200 A-45**
Code	**M81142**	**M81142**	**M81141**

C-80

Portable single and three-phase power analyzer

Description

- Measurement of the main electrical parameters of a single-phase network, balanced three-phase network and unbalanced three-phase network with neutral
- Measurement of energy
- Measurement of the THD in A and V
- Detects leakage currents and the turning direction of phases
- Internal memory to record parameters automatically
- Display of the maximum and minimum values of electrical parameters
- Reduced size and weight (300g) very robust and easy to use
- Auto-detection of clamp

Application

- Calculation of the capacity in kvar to compensate the installation
- Display of energies compensated with a determined capacitor bank
- Creation of harmonic distortion alarms to detect resonances

Features

Power supply circuit	
Voltage	2 x 1,5 V dc (LR6 AA-type batteries)
Measurement circuit	
Nominal voltage	50 ... 500 Vac
Frequency	45 ... 65 Hz
Nominal current	2 V (automatic, depending on the clamp)
Voltage overload	10% (550 V ac)
Current overload	10%
Class/Accuracy	
Voltage	0.5% ± 2 digits
Current	0.5% ± 2 digits
Power rating	1% ± 2 digits
Build features	
Operating autonomy	200 hours
Keyboard	1 on/off + 7 function keys
Display	7 segments, 3 lines x 4 digits, indication icons
Voltage terminals	L1, L2, L3 / N
Current clamp connector	4 wires (ID signal -> automatic detection)
Record	Circular file (between 1 and 90 min)
Dimensions	172 x 100 x 50 mm
Weight	300 g
Accepted clamps	**CP 2000/200, CP 1000, CP 500, CP 100, CP 5, CF-5, C-FLEX 200 / 2000 / 20000**
Safety	
IEC 61010-6-1	
Standards	
IEC 61000-6-3: 1996, Emissions in residential and commercial environments and light industry **CISPR 11:1997 MOD, Radiated (CISPR 22: 1997 MOD-Class A)**	
IEC 61000-6-4: 1997, Emissions in industrial environments. **CISPR 11: 1997 MOD, Radiated (CISPR 22: 1997 MOD-Class A)**	
IEC 61000-6-2:1999, Immunity in industrial environments **IEC 61000-4-2:1995, Electrostatic discharge** **IEC 61000-4-3:2002, Radiated electromagnetic field** **IEC 61000-4-4:1995, Rapid transient bursts** **IEC 61000-4-5:1995, Shockwaves** **IEC 61000-4-6:1996, RF in common mode** **IEC 61000-4-8:1993, Magnetic field at 50 Hz**	
IEC 61000-6-1:1997, Immunity in residential and commercial environments and light industry **IEC 61000-4-5:1995, Shockwaves**	
IEC 61010-6-1:2001, Electrical security	

C-80

Portable single and three-phase power analyzer

References

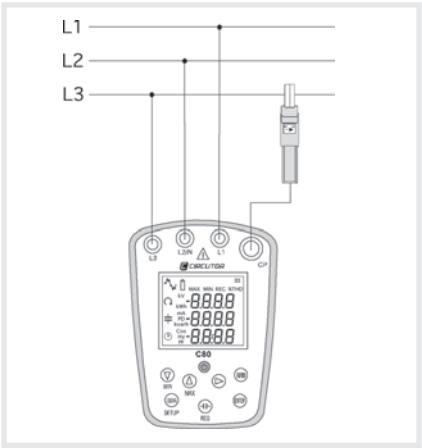
Analyzer	Clamps	Type	Code
		C-80, Power analyzer	M80120
Kits			
		C-80 / 1000	M80121
		C-80 / 2000	M80122
		C-80 / C-FLEX 45	M80123
		C-80 / C-FLEX 80	M80124
		C-80 / C-FLEX 45	M80125

All kits include 3 voltage cables + case

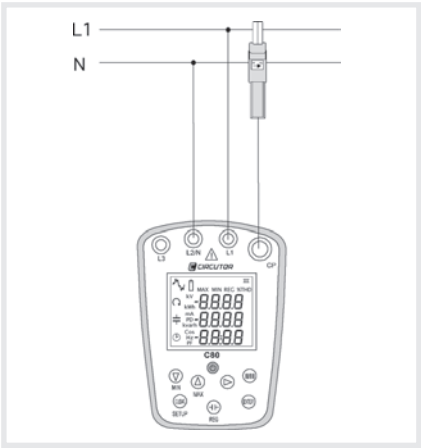
Parameters measured

Parameter	Symbol (unit)	Balanced Three-phase / Single-phase system		
		Instantaneous	Maximum	Minimum
Voltage	V	Yes	Yes	Yes
Current	A	Yes	Yes	-
Frequency	Hz	Yes	Yes	Yes
Active power	W	Yes	Yes	-
Reactive power (L and C)	var	Yes	Yes	-
Apparent power	V · A	Yes	Yes	-
Power factor	PF	Yes	Yes	-
Cos φ	cos φ	Yes	Yes	-
Active energy	W · h	Yes	-	-
Power factor (L)	var · h L	Yes	-	-
Power factor (C)	var · h C	Yes	-	-
THD (%) U, I	% THD	Yes	Yes	-
MD (Max demand)	PD	Yes	Yes	-

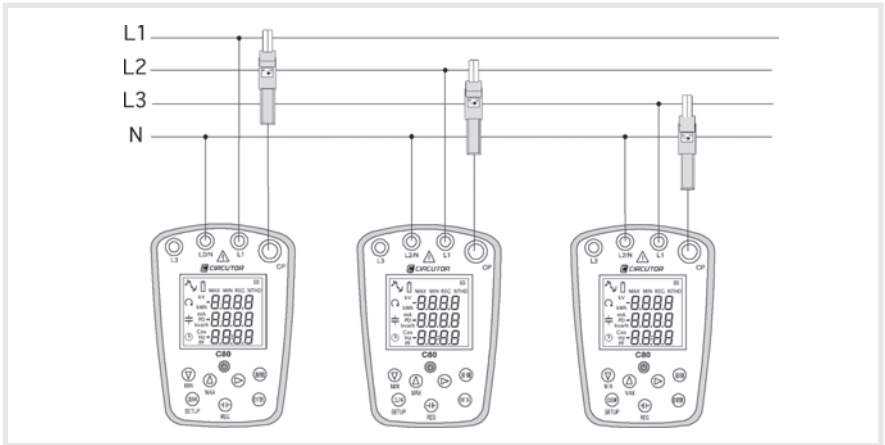
Balanced Three-phase System



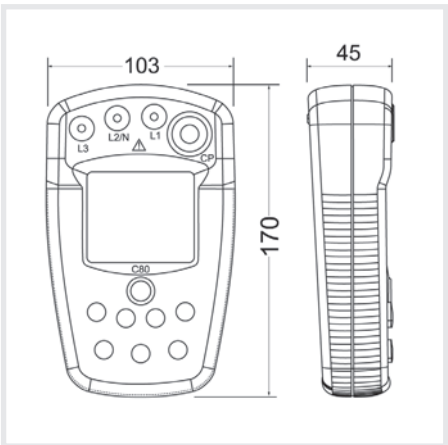
Balanced single-phase system



Umbalanced Three-phase System with neutral



Dimensions



Clamps
C-80

Clamps	CP-5	CP-100	CPR-1000	CPR-500	CP-2000/200
Measurement range	0.05..0.5 A ac	1...100 A ac	1...1000 A ac	1...500 A ac	1...200 A ac 10...2000 A ac
Nominal frequency	48...65 Hz	48...65 Hz	48...65 Hz	48...65 Hz	48...65 Hz
Output voltage	2 V ac	2 V ac	2 V ac	2 Vac	2 V ac
Dielectric rigidity	5200 V, 50 Hz, 1 min	5200 V, 50 Hz, 1 min	5200 V, 50 Hz, 1 min	5200 V, 50 Hz, 1 min	5200 V, 50 Hz, 1 min
Scale base error	1 %	0,5 %	0,7 %	0,7 %	Scale 200: 0.5 % (+70 mA) Scale 2000: 0.5% (+100 mA)
Maximum conductor diameter	20 mm	20 mm	52 mm	52 mm	64 mm
Maximum busbar	20 x 5 mm	20 x 5 mm	1 - 50 x 5 mm or 4 - 30 x 5 mm	1 - 50 x 5 mm or 4 - 30 x 5 mm	5 - 125 x 5 mm or 3 - 100 x 10 mm
Description **Code**	**CP-5** **Code M81031**	**CP-100N** **Code M81032**	**CPR-1000** **Code M81034**	**CPR-500** **Code M81033**	**CP-2000/200** **Code M81035**

Clamps
C-80

C-FLEX Clamps 20 000 / 2000 / 200 A-120

Longitude sensor	120 cm
Scales	200 A / 2000 A / 20000 A or 100 A / 1000 A / 10000 A
Sensitivity in mV	Scale 200 or 100: 10 mV / A Scale 2000 or 1000: 1 mV / AScale 20k or 10k: 0.1 mV / A
Measurement amplitude	5 A...20 kA
Bandwidth	10...20 kHz
Accuracy	1 %
Electrical safety	Double insulation IEC 1010 - 100 V - Cat III - Degree of contamination 2
Admissible output overvoltage	600 V (peak factor 1.5)
Ambient conditions	
Temperature	-10...+55 ºC
Humidity	90 % HR (at 50 ºC)

Scales	Type	Code
20 kA / 2000 A / 200 A	**C-FLEX 20000/2000/200 A-120**	**M81153**
10 kA / 1000 A / 100 A	**C-FLEX 10000/1000/100 A-120**	**M81653**

*** Codes for 1 clamp**

C-FLEX Clamps 20 000 / 2000 / 200 A-80

Longitude sensor	80 cm
Scales	200 A / 2000 A / 20000 A or 100 A / 1000 A / 10000 A
Sensitivity in mV	Scale 200 or 100: 10 mV / A Scale 2000 or 1000: 1 mV / AScale 20k or 10k: 0.1 mV / A
Measurement amplitude	5 A...20 kA
Bandwidth	10...20 kHz
Accuracy	1 %
Electrical safety	Double insulation IEC 1010 - 100 V - Cat III - Degree of contamination 2
Admissible output overvoltage	600 V (peak factor 1.5)
Ambient conditions	
Temperature	-10...+55 ºC
Humidity	90 % HR (at 50 ºC)

Scales	Type	Code
20 kA / 2000 A / 200 A	**C-FLEX 20000/2000/200 A-80**	**M81152**
10 kA / 1000 A / 100 A	**C-FLEX 10000/1000/100 A-80**	**M81652**

*** Codes for 1 clamp**

Longitude sensor	45 cm
Scales	200 A / 2000 A / 20000 A or 100 A / 1000 A / 10000 A
Sensitivity in mV	Scale 200 or 100: 10 mV / A Scale 2000 or 1000: 1 mV / AScale 20k or 10k: 0.1 mV / A
Measurement amplitude	5 A...20 kA
Bandwidth	10...20 kHz
Accuracy	1 %
Electrical safety	Double insulation IEC 1010 - 100 V - Cat III - Degree of contamination 2
Admissible output overvoltage	600 V (peak factor 1.5)
Ambient conditions	
Temperature	-10...+55 ºC
Humidity	90 % HR (at 50 ºC)

Scales	Type	Code
20 kA / 2000 A / 200 A	**C-FLEX 20000/2000/200 A-45**	**M81151**
10 kA / 1000 A / 100 A	**C-FLEX 10000/1000/100 A-45**	**M81651**

CIR-e³

Description

- is a portable high performance recorder designed for energy audits. Its design and easy operation make it ideal for carrying out energy studies.
- 4 quadrants
- Measurement in true root mean square
- Built-in energy meter
- With 4 voltage channels and 3 current channels
- SD card to store the parameters (up 2Gb)
- Compatible with software Power Vision.
- Power supply 100…400 Vac and 70…315 Vdc
- Reduced size and weight (300g) very robust and easy to use
- Auto-detection of clamp
- indication of an incorrect connection
- The measurement unit includes the right of use of the associated software that is required to handle the energy data of the CIR-e³ Web application
- Magnet fixing

Application

Most portable recorders in the market follow highly complex parameters configuration and start-up processes. CIR-e³ has been designed with the purpose of simplifying the setup and execution of measurements and, as a consequence, the analysis of energy audit studies.

- Energy audits in installations
- Preventive control and maintenance of substations
- Subcontracting energy audits

Features

Power supply circuit			
Voltage		100...400 V ac, 70...315 V dc	
Frequency		50...60 Hz	
consumption		9 V·A	
Measurement circuit			
Voltage (ph-N)		10...400 V ac (ph-N) ± 10%	
Voltage ph-ph		17...520 V ac (ph-ph) ± 10%	
Current (.../2 V)		2,5...100 % FS	
Frequency		45...65 Hz	
Maximum/minimum current, about the clamp and scale			
Clamps		Scale	Range
E-FLEX 20/54 cm	L1/sc1	200 A	5...200 A
	L2/sc2	2 000 A	50...2 000 A
	L3/sc3	20 000 A	500...20 000 A
CP-5		5 A	0,05...5 A
CP-100		100 A	1...100 A
Accuracy			
Voltage		0,5 % FS	
Current		1 % FS	
Active power		2 % FS	
Energy		2 % FS	
Others feautres			
Working temperature		10...50 ºC	
Altitude		2 000 m	
Humidity		95 % HR without condensation	
Storage temperature		-10...65 ºC	
Protection		IP 53	
Weight (only CIRe3)		0,677 kg	
weight (with packaging)		0,733 kg	
Standards			

ELECTRICAL SAFETY REGULATIONS: IEC 60664-1, IEC 61010-1,IEC 62053-21, UL 94, VDE 110
ELECTROMAGNETIC EMISSIONS: IEC 61000-3-2, IEC 61000-3-3, IEC 61000-6-4, EN 55011, EN 55022
ELECTROMAGNETIC IMMUNITY: IEC 61000-6-2, IEC 61000-4-2, IEC 61000-4-3, IEC 61000-4-4, IEC 61000-4-5, IEC 61000-4-8, IEC 61000-6-1, IEC 61000-4-11, ENV 50141

CIR-e³

Portable single and three-phase power analyzer

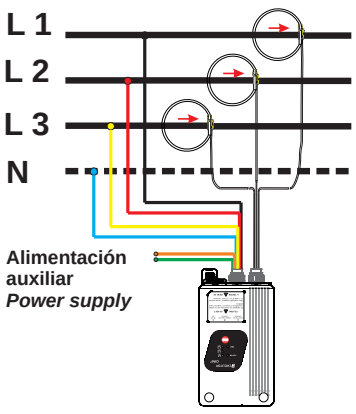
Parameter	Symbol (unit)	L1	L2	L3	III	Max./ Min.
Voltage	V	Yes	Yes	Yes		Yes
Current	A	Yes	Yes	Yes		Yes
Frequency	Hz	Yes				Yes
Active Power	W	Yes	Yes	Yes	Yes	Yes
Reactive Power (L & C)	varL, varC	Yes	Yes	Yes	Yes	Yes
Apparent Power	V · A	Yes	Yes	Yes	Yes	Yes
Power Factor	FP	Yes	Yes	Yes	Yes	Yes
Active Energy	W·h				Yes	
Reactive Energy (L & C)	var·hL,var·hC				Yes	
Aparent energy	V·A·h				Yes	
Harmonic decomposition *U*, *I* (50)		Yes	Yes	Yes		
THD (%) *U*, *I*	% THD	Yes	Yes	Yes		
MD (Max demand) - act.Pow	W (MD)				Yes	Yes
MD (Max demand) -App.Pow	V·A (MD)				Yes	Yes
Fundamental *U*, *I*		Yes	Yes	Yes		
Flicker WA	WA	Yes	Yes	Yes		
Flicker Pst	Pst	Yes	Yes	Yes	Yes	Yes

References

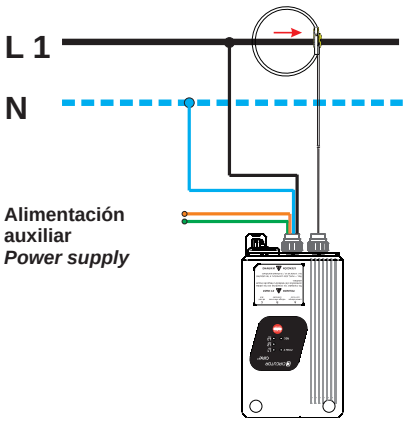
Analyzer	Clamps	Type	Code
CIR-e³	-	**CIR-e³**	**M85020**
CIR-e³	E-FLEX 54	**CIR-e³ E-FLEX 54**	**M85000**
Accesories			
Kit 3 clamps E-FLEX 54 200/2.00/20.000 A			**M86010**
Kit 3 clamps CP-5 CIR-e³			**M86011**
Kit 3 clamps CP-100 CIR-e³			**M86012**
kit 6 Voltage cables			**M86020**
Carring case			**M89931**

Connections

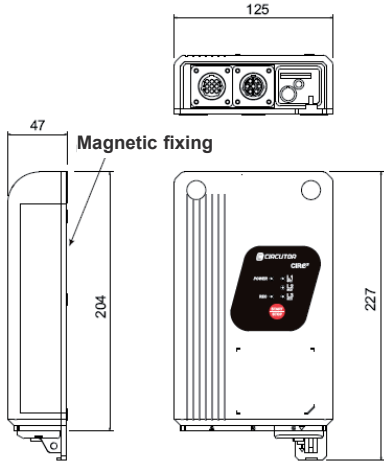
Umbalanced three-phase system



Balanced single-phase system



Dimensions



CIR-e^{Q}

Description

- Voltage measurement
- Voltage quality measurement parameters
- Configurable by pC
- Store electric parameters and voltage events in SD card (up to 2 GB)
- Posibility of external power supply 100…400 Vac and 70…315 Vdc
- Reduced size and weight (300g) very robust and easy to use
- The measurement unit includes the right of use of the associated software that is required to handle the data of the CIR-e^{Q} Web application (STD file)
- Magnet fixing

Application

- has been designed to incorporate the latest technologies and it offers the most advanced performance features in the market for the measurement and recording of the electrical parameters of electrical networks

features

Power supply circuit	
Voltage	100...400 V c.a., 70...315 V c.c.
Frequency	50...60 Hz
Consumption 100 / 400 Vac	5,2 / 22 V·A
Consumption 70 / 315 Vdc	3 W
Measurement circuit	
Voltage (ph-N)	10...400 V ac. (ph-N)
Voltage ph-ph	17...520 V ac. (ph-ph)
Frequency	45...65 Hz
Accuracy	0,5 % FS.
Others features	
Working temperature	10...50 ºC
Altitude	2 000 m
Humidity	95 % HR without condensation
Storage temperature	-10...65 ºC
Protection	IP 53
Weight (only CIRe3)	0,677 kg
weight (with packaging)	0,713 kg
Standard	
ELECTRICAL SAFETY REGULATIONS: IEC 60664-1, IEC 61010-1, UL 94, VDE 110 **ELECTROMAGNETIC EMISSIONS**: IEC 61000-3-2, IEC 61000-3-3, IEC 61000-6-4, EN 55011, EN 55022 **ELECTROMAGNETIC IMMUNITY**: IEC 61000-6-2, IEC 61000-4-2, IEC 61000-4-3, IEC 61000-4-4, IEC 61000-4-5, IEC 61000-4-8, IEC 61000-6-1, IEC 61000-4-11, ENV 50141	

CIR-e^{Q}

Portable quality network analyzer

Measured parameters

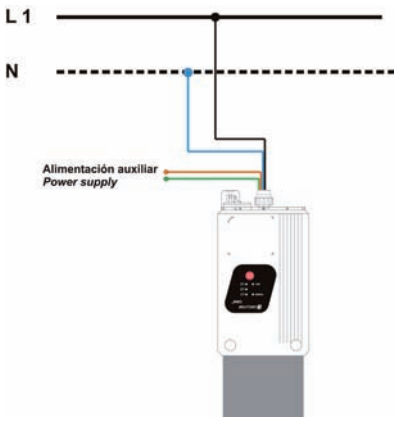
Parámetro	Símbolo (unidad)	L1	L2	L3	III	Máx./Min.
Phase-neutral voltage	V	Yes	Yes	Yes		Yes
Phase-Phase voltage	V	Yes	Yes	Yes		Yes
Frequency	Hz	Yes				Yes
THD *U*		Yes	Yes	Yes		Yes
Fundamental *U*		Yes	Yes	Yes		
Voltage harmonics (50º)	Har	Yes	Yes	Yes		
Quality %		Yes	Yes	Yes		
Crest factor		Yes	Yes	Yes		
Flicker WA	WA	Yes	Yes	Yes		
Flicker Pst	Pst	Yes	Yes	Yes		Yes
Unbalance	kd V				Yes	Yes
Asymmetry	Ka V				Yes	Yes
Asymmetry						
Over voltage		Yes	Yes	Yes		
Hole voltage		Yes	Yes	Yes		
Cut voltage		Yes	Yes	Yes		

References

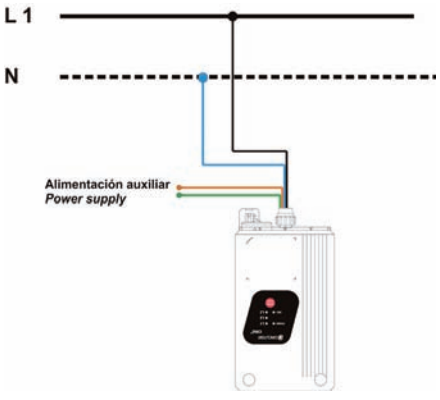
Analyzer		Code
CIR-e^{Q}		M85010
Accesories		
kit 6 Voltage cable		M86020
Carring bag		M89931

Connections

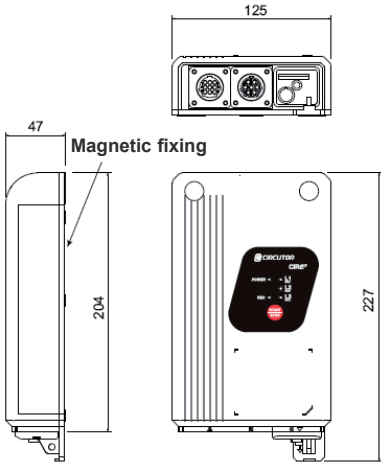
Umbalanced three-phase system



Balanced single-phase system



Dimensions



Special clamps

High voltage clamps

PI-23

High voltage clamps

- Open clamps can be used to measure current in points where the power supply can not be interrupted

Application

- **PI-23**

Features

Maximum voltage	36 kV	
Maximum measurement current	400 A (2 scales)	
Maximum conductor diameter	25 mm	
Voltage circuit		
Battery	9 V, 6F22	
Frequency	50 Hz (60 Hz, on demand)	
Backlit	LCD	
Digits	3	
Accuracy	± 2 %	
Build features		
Degree of protection	IP 50	
Weight (without battery)	290 g	360 g with receiver
Ambient conditions		
Operating temperature	0…+50 ºC	
Relative humidity	0…80 % RH	
Vicat softening temperature	150-155 ºC	
Standards		
61010 Electrical safety		

References

I max	*U* max	∅ max	Type	Code
400 A	36 kV	25	**PI-23 + case (50 Hz)**	**M80132**
400 A	36 kV	25	**PI-23 + case (60 Hz)**	**M80132001**
6 m Pole (3 sections of 2 m)				**M89941**

Clamps with logger

CPL

Clamps with memory

Description

- Current sensing clamps that measure and integrate the current in true root mean square.
- Internal memory used to store mean values (128 kB)
- Measurement in true root mean square
- Maximum and minimum current values
- Trigger option
- Real-time clock to record events
- PC connection to program and obtain data recorded

Features

Voltage circuit	
Through an external power supply unit	230 Vac (± 15 %)
Self-power supply	I >15 % I_n
Frequency	50 ... 60 Hz
Measurement range	1 at 100% I_n
Accuracy with external power supply	1 % of the reading (± 2 digits
Memory	128 KB (> 8000 records)
Type of memory	Linear
Safety	Category III 640 V (self-power supply), EN 61010
Standards	**EN 60664, VDE 0110, UL 94, EN 60801, EN 6100, EN 61010-1**

References

Includes memory with power supply, RS-232 interface and PowerVision software

T-3V

Earth resistance meter

Description

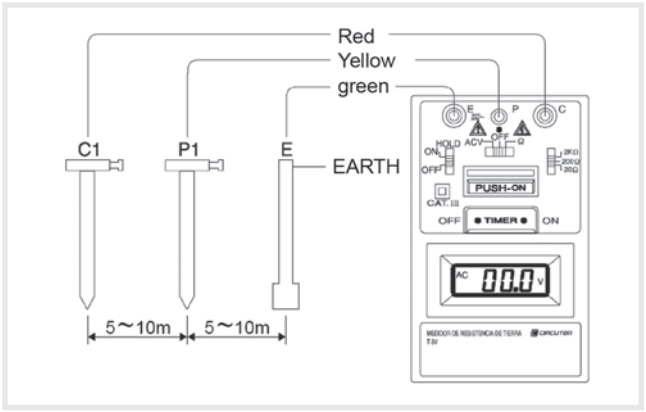
- Capable of measuring the earth voltage
- The 2 mA measurement current can be used to make resistivity tests of the earth to trigger the earth circuit breakers of the circuit being tested
- Battery operated
- Self-disconnection. The timer is operated automatically after no control has been used for 3~6 minutes. The meter is in operation when the operation push-button and the timer activation button are pressed at the same time
- Reading memory function
- Open circuit indicator. The OFF LED indicates when the connection of the test bits is correct
- Compact and light
- Designed to comply with the **IEC-1010** security standard (**EN61010**)

Features

Measurement system	Earthing resistance to earth with a constant current inverter 800 Hz, 2 mA approx.
Earth voltage	0...200 V ac, 40...500 Hz
Earth resistivity	Scale and resolution 0 ~ 20 Ω (0.01Ω) 0 ~ 200 Ω (0.1Ω) 0 ~ 2000 Ω (1Ω)
Earth voltage accuracy	± (1 % read. + 2 dig.)
Earth resistivity accuracy	± 0.1% _ or (when greater); ± (2 % read. + 2 dig.)
Safety standards	**IEC-1010** (**EN 61010**)
Low battery indicator	The "B" symbol will appear on the display
Read memory indicator	The "DH" symbol will appear on the display
Over-margin indication	“1” on the most significant digit (MSD)
Open circuit indicator	The operation indicator (2) will be turned off
Timer (auto-disconnection)	When no control is operated, after 3 ~ 6 minutes
Indicator	3 digit LCD (2000 records)
Power supply	Six 1.5 V batteries (R6C)
Dimensions	W. 163 x H. 100 x D. 50 mm
Weight	Approx. 600 g (including batteries)
Accessories	Testing bits (red – 15 m, yellow – 10 m, green – 5 m), auxiliary earthing rods, carrying case, instruction manual

Type	Code
T-3V	**M80410**

Connections



MEG-S

Insulation meter

Description

The **MEG-S** unit has a backlit LCD display and it is used to take insulation (MΩ), continuity (Ω) and AC voltage readings.

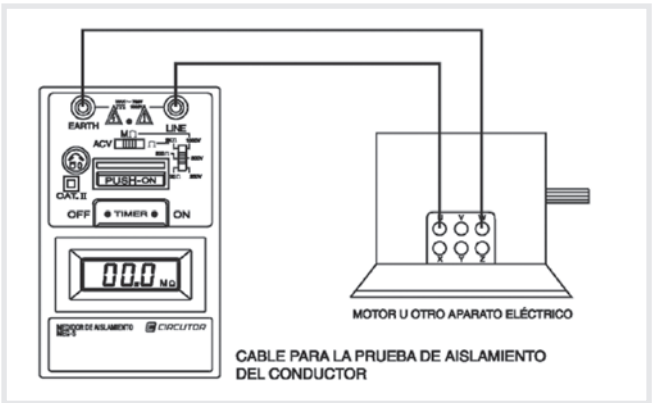
- Press a button for instantaneous operation. In addition, in the case of taking continuous readings of MΩ or Ω, the unit has a built-in timer with automatic disconnection after 3 to 5 minutes to save on the consumption of batteries
- LED indicator (red) to check the insulation and continuity
- Use of the high-performance and accuracy DC-DC converter
- Carrying case
- Specially designed to measure the insulating resistance of domestic electrical appliances, distribution of energy lines and installations

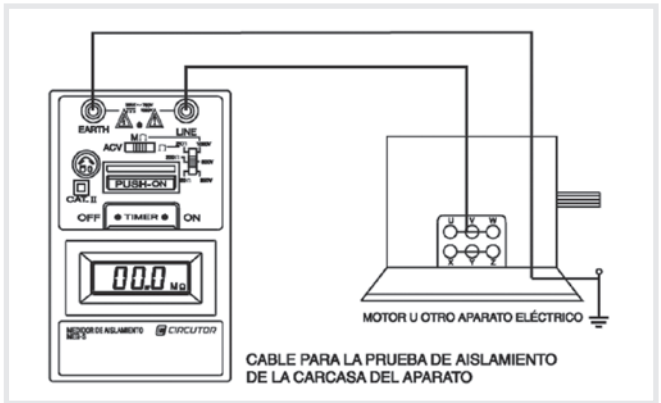
Type	Code
MEG-S	**M80420**

Features

Indicator	$3^{1/2}$ digit LCD indicator with maximum reading of 1999
Insulation reading	20 M_ ± 1.5 % read. ± 2 dig. 200 M_ ± 2.5 % read. ± 2 dig. 2000 M_ ± 5.0 % read. ± 3 dig.
Auto-range function	(for Insulation Measurement)
Test voltage	250 V, 500 V, 1000 V DC ±10%
AC voltage measurement	0 – 750 V ±1.5 % read. + 2 dig.
Impedance	10 MΩ
Continuity measurement	0 - 20 Ω ± 2 % read. ± 4 dig. 0 - 200 Ω ± 1.5 % read. ± 2 dig. 0 - 2 kΩ ± 1.5 % read. ± 2 dig. Short-circuit current 3 mA Acoustic continuity indication under: 8 Ω scale of 20 Ω 10 Ω scale of 200 kΩ 40 Ω scale of 2 kΩ
Over-margin indication	“1” on the most significant digit (MSD)
Timer	Automatic disconnection after 3 minutes
Non-disruptive voltage	In compliance with the IEC-1010 security requirements category III
Power supply	Six 1.5 V batteries (R6C)
Dimensions	W. 163 x H. 100 x D. 52 mm
Weight	Approx. 430 g (including batteries)
Accessories	Batteries (6) Testing bits Carrying case Instruction manual

Connections





CPM

Current sensing clamp - multimeter

Description

- The **CPM** current sensing clamp offers the voltage, current, resistance and frequency measurement functions, with an acoustic continuity buzzer and diode test.
- Three push-buttons are used to select the measurement hold (HOLD), maximum value (MAX) and DC current measurement reset (DCA ZERO) functions
- The meter is powered with a 9 V battery. Its design and double insulation make the CPM a safe and robust instrument

Type	Code
CPM	**M80430**

Features

Indicator		3 1/2 digit LCD indicator with maximum reading of 1999
Presentation functions	Hold MAX	Measurement retention Retention of the maximum measurement value
Polarity		Automatic, positive by default and negative polarity indicator (-)
Over-margin		(OL) or (-OL) will be shown on the display
Zero		Automatic
Low battery indicator		" ⊟ " will be displayed when the voltage of the battery is under the normal operating levels
Reading rate		2.5 readings per second, nominal
Power supply		9 V Battery, **IEC 6F22**
Autonomy		200 standard hours, with carbon-zinc battery
Ambient conditions Operating temperature Storage temperature		 0 °C to 40 °C (RH 0-70%) 20 °C to 60 °C, (RH 0-80%) with the battery removed
Dimensions		250 (W) x 100 (H) x 46 mm. (D)
Weight		380 g, including battery
Accessories		A pair of test bits. Carrying case
Reference conditions		Environmental conditions: 23 °C ± 5 °C, RH < 75%
DC Voltage Scale Accuracy Input impedance Overload protection		 600 V ± (0.5% read. + 1 digit) 10 MΩ 600 V dc or ac. rms
AC Voltage (50-500 Hz) Scale Accuracy Input impedance Overload protection		 200 V, 600 V ± (1.2% read. + 4 digits) 10 MΩ 600 V dc or ac. rms
Resistance Scales Accuracy Open circuit voltage Overload protection		 2 kΩ, 200 kΩ ± (1.2% read. + 1 digit) 0.3 V dc 600 V dc or ac rms
Frequency (Auto-range) Scales Accuracy Sensitivity Overload protection		 2 kHz, 20 kHz ± 0.1% read. + 3 digits 80 V rms minimum 600 V dc or ac rms
Continuity Acoustic warning Overload protection		 Lower than 30 Ω in the 2 kΩ 600 V dc or ac rms
Diode test Testing current Accuracy Open circuit voltage Acoustic warning Overload protection		 1.0 mA ± 0.6 mA ± (6.0% read. + 3 digits) 3,0 V dc standard < 30 mV 600 V dc or ac rms
DC Current (Place the conductor in the centre of the piece) Scales Resolution Accuracy Overload protection		 200 A, 700 A 100 mA ± (1.5% read. + 5 digits) 700 A dc Max. during one minute
AC Current (40 Hz to 500 Hz) (Place the conductor in the centre of the piece) Scales Resolution Accuracy Overload protection		 200 A, 700 A 100 mA ± (1.5% read. + 5 digits) 50 to 60Hz ±(3.5% read. + 5 digits) 40 to 500 Hz 700 A dc Max. during 1 minute

CDB

Description

- Designed to take readings in single or three-phase installations
- Measurement of amperage with voltages per phase of 190 to 260 V
- Inspection of all sorts of residual current devices
- Powered with batteries or accumulators
- Measurement of the voltage between the phase and earth UL-PE
- Measurement of the voltage between the phase and neutral UL-N
- Measurement of the voltage between the neutral and earth terminal UN-PE
- Measurement of frequency
- Measurement of the protection loop impedance RS
- Measurement of the protection loop impedance RS, with no disconnection of the RCD
- Measurement of the trigger time tA of the RCD with earth leakage intensity I_N, 5x I_N and pulsed current
- Checking the RCD with gradual incremental voltage, measurement of the operating intensity of the RCD I_ and measurement of the contact voltage UI_ when the RCD is disconnected
- Measurement of the contact voltage UI_N when passing the nominal operation intensity 0.45x I_N through earth with no synchronisation of the RCD, checking that the RCD is not disconnected
- Cabling inspection (results are displayed in the form of symbols)
- Optional backlit LCD display
- The values read are automatically stored and then displayed on the display

Basic operating instructions

- The instrument can be used at a room temperature of - 5° C to 40° C. Instruments stored during a long period of time at temperatures under 0ºC must be acclimatised during 2 hours prior to storage
- The maximum relative humidity in air allowed is 80 % at 23° C
- The instrument must not be exposed to aggressive gases and vapours that could cause oxidation, liquids and dust
- The instrument can only take readings under reference conditions with no additional errors
- The maximum resistance of the housing to heat is a maximum of 80º C
- The instrument can not take readings when the ºC overheating symbol is displayed
- The instrument can also be connected between phases during a maximum interval of 5 minutes
- All units under the RCD (Capacitors, rotating machines, etc.) as well as the residual currents of circuits can have an impact on the readings
- The voltage drops in batteries under the limits allowed is shown by the symbol that appears on the lower left corner of the screen
- The correct battery polarity must be maintained when changing batteries (in accordance with the battery clamp symbols). Used batteries will reduce the clarity of the display, even though this does not have an impact on the operation of the instrument. Batteries can not be changed when the instrument is connected to the mains. The instrument must not be connected to the mains when the battery lid is damaged. The lid must be changed immediately
- The two-wire adaptor can only be connected to the CDB instrument for measuring purposes, i.e., it can not be connected to the power supply
- The CDB plug must be connected to the adaptor's output (when a two-wire adaptor is used) before it is connected to the mains or to the load being measured

Coding

LXM

Luxmeter

Type	Code
LXM	M80450

Features

Measurement ranges	0.00 to 39.99/399.9/3999/39990 lx 0.000 to 3.999/39.99/399.9/3999 fc automatic selection / range manual
Resolution	0.01 lx ~ 10 lx ; 0.001 fc ~ 1 fc
Accuracy	±3% rdg ±5 digits
Temperature features	±0.1% / º C
Response time	0.5 sec.
Light detector: Photodiode	Yes
Operating temp. / humidity	0º C ~ 40º C (32 ºF ~ 104º F) , 0 ~ 80% HR
Storage temp. / humidity	-10º C ~ 50º C (14ºF ~ 122º F) , 0 ~ 70% HR
Range Overload	" ---- " display
Power supply	one 9V battery ,006P or IEC 6F22 or NEDA 1604
Battery working life	Approx. 170 hours (Alkaline battery)
Dimensions	196 (L) x 54 (W) x 33 (H) mm 7.7 (L) x 2.1 (W) x 1.3 (H) inches
Weight	Approx. 180 gr
Accessories	9V Battery, instruction manual

MS-148

Alternating voltage detector

- Measurement of ac, from 70 to 600 V ac, with no need to be in contact with the voltage

Coding

Type	Code
MS-148	M80440

AR5 / AR5-L Accessories

Charging power supply and interface (RS-232)

Description

Includes:
- 80 - 250 V ac Power supply
- Power supply cable
- Cable to connect the power supply and the **AR5** / **AR5-L**
- Series cable (RS-232) to connect the power supply and PC

Code

Battery

Description

Replacement for the internal battery of the **AR5** / **AR5-L** analyzer

Code **M89904**

Case for AR5 / AR5-L

Description

Code **M89901**

Carrying bag for AR5 / AR5-L

Description

Includes pockets for the following:
- One **AR5** or **AR5-L** analyzer
- 4 current sensing clamps (**CP5**, **CP100**, **CPR500**, **CPR1000**, **CP2000/200**, **CF-5** or any kit with flexible clamps)
- Power supply and power supply / voltage measurement cables
- Folder with the manuals of PowerVision and other programs
- Accessories of the **AR5** or **AR5-L** analyzer

Code **M89905**

AR5 / AR5-L Accessories

Case for AR5-L clamps

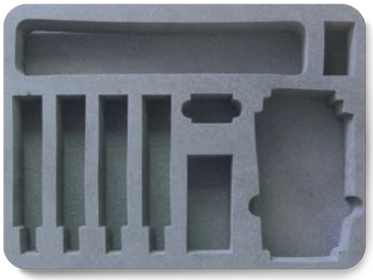
Description

Case for AR5-L clamps

Code **M89921**

1000 L Case

(with protective foam, for CPR-1000 clamps of the AR5-L analyzer)



Description

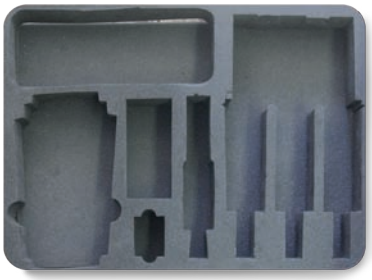
Includes pockets for the following:

- One **AR5** or **AR5-L** analyzer
- 4 **CPR100** current sensing clampsPower supply and power supply / voltage measurement cables

M89923

2000 L Case

(with protective foam, for CPR-2000/200 clamps of the AR5-L analyzer)



Description

Includes pockets for the following:

- One **AR5** or **AR5-L** analyzer
- 4 **CPR2000** / **200** current sensing clamps
- Power supply and power supply / voltage measurement cables

Code **M89924**

C-FLEX Case

(with protective foam, for C-FLEX clamps of the AR5 or AR5-L analyzer)

Code **M8992F**

AR5 / AR5-L Accessories

Check Meter + optical reader

Description

Includes:

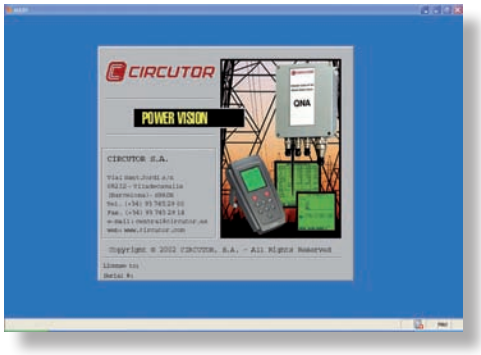
- Check Meter Program for **AR5-L** (last version). The corresponding cartridges are included, such as the CheckMeter program for **AR5-L** and the co-processor.
- **Check Meter** optical sensor (with the optic fibre cable to monitor meters and the communications and power supply cable that connects it to the **AR5-L**)
- Program User Manual CheckMeter (including the explanation of how the sensor must be used)

Code **M806C3**

Power Vision

Description

- **AR5AR5-LCIRCUTOR**



For more information, see M.9 Catalogue

Code **M90411**

PC Communications cable

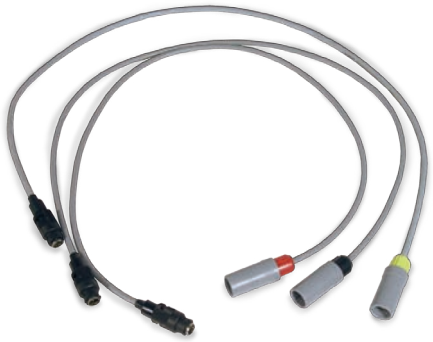
Description

- RS-232 Series connection cable, with two DB9 connectors (male and female), with a length of 1.2 m. Used in **AR5** and **AR5-L** analyzers to download the data stored in the PC with the Power Vision Software.

Code **M8991E**

AR5 / AR5-L Accessories

Adaptor cable (3 cables) AR5-L / AR5



Description

Code **M89917**

Adaptor cable (1 cable) AR5-L / AR5

Description

- 4-way female connector on one end and 3-pin male connector on the other end.

M89922

Adaptor cable (1 cable) AR5 / AR5-L

Description

- 3-way female connector on one end and 4-pin male connector on the other end, with phase colour.

Code **M89932**

Cable to connect the AR5 / AR5-L unit to the power supply

- Cable to connect the power supply input and communications between the analyzer and power supply.

M8992C

AR5 / AR5-L Accessories

Set of 4 voltage cables

Description

- Set of 4 cables to connect the voltage inputs of the **AR5** / **AR5-L** analyzer to an electric panel or sub-panel.

Code **M89908**

Crocodile clamp (1 unit)

Description

- Clamp that adapts to the voltage cable and can be connected to an electric panel or sub-panel to measure voltage.

Code **M89909**

C-80 Accessories

3 voltage cable replacement kit

Description

- Set of 3 cables to connect the voltage inputs of the C-80 analyzer to an electric panel or sub-panel.

Code **M89907**

C-80 Case

Description

- Case to carry the **C-80** analyzer easily and safely.

M89931